

# Research Summary

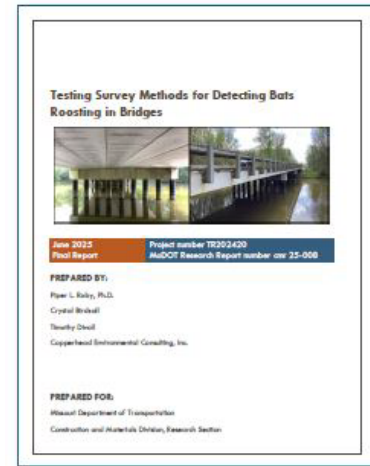
## Testing Survey Methods for Detecting Bats Roosting in Bridges

Human activities impact natural habitats for flora and fauna, and many plants and animals have adapted to compensate for the lack of feeding, reproducing, or resting opportunities. In the eastern United States, bats naturally roost in trees, caves, or rock crevices, but several species are now found to roost in houses, bridges, and mines, to name a few. In fact, it is unusual to find little brown bats (*Myotis lucifugus*) using natural roosts and they are more frequently found in the attics of houses or using bat boxes. With the knowledge that bats are using transportation structures as roosts throughout the US (and likely throughout the industrialized world), it is now important to understand the best way to detect bats in these structures.

Evidence of bat roosting in bridges is not always obvious, therefore this study aimed at testing a variety of methods to accurately determine if bats were present in bridges during a given visit. After conducting a power analysis to determine the statistically effective research design, nine methods were tested on 19 bridges four times each from April through October 2024. One bridge was visited only three times because it was destroyed by Hurricane Helene within the last round of data collection. Six methods tested during the day were 1) unaided human vision and hearing, 2) aided human vision with spotlights, 3) audible detection with an acoustic

detector, 4) aided human vision with a borescope, 5) visual search with a thermal camera, and 6) ultrasonic agitator to induce bat vocalization. Three emergence methods tested in the evening were 7) using unaided human vision, 8) video recording with a thermal camera, and 9) vocalization recording with acoustic bat detectors.

The data collected resulted in a robust analysis, so results were statistically supported. The top model to detect bats roosting in bridges was to use an acoustic detector at emergence. Although not statistically significant, the second-best model was to use a thermal camera to detect bats at emergence. In reality, the most reasonable way to detect bats is to first visually inspect the bridge. If none are documented or if more information is needed about colony size or timing of emergence, the use of a thermal camera to record evening emergence is preferred. Even though the model indicated that using an acoustic detector at emergence, it is possible that bats not roosting in the bridge may be detected, thereby resulting in a false positive. Recording emergence with a thermal camera allows for the visual interpretation of behavior, such as a bat flying through the area or dropping down out of the bridge. The use of a thermal camera can also provide information about the number of bats roosting in the bridge.



Methods tested that did not work well overall include borescope, acoustic detectors during the day, and agitators. A borescope was only useful if the observer was close to the underside of the bridge, and at that point, it was visible with a spotlight, so a borescope was not needed. Bats typically did not vocalize in the ultrasonic range while roosting under bridges, so an acoustic detector was rarely effective. If it was, bats were also vocalizing within human auditory range, so an acoustic detector was not needed. Although bats visually “cowered” when an agitator was used, they rarely vocalized, so an agitator was not effective. If the agitator did induce vocalization, it was typically when bats were already vocal.

*“Statistically the best model was to detect bats with an acoustic detector during emergence, but in reality, this can result in false positive detections.”*

Many guidance documents for documenting bats roosting in bridges start with a daytime visual and auditory assessment. All documents warned that the use of acoustic detectors can be misleading. We agree with these points and suggest that using thermal cameras during emergence is the most definitive method.



Figure 1. Mexican free-tailed bats (*Tadarida brasilienses*) on left and big brown bats (*Eptesicus fuscus*) on right roosting under a bridge in central Tennessee.

### ***Project Information***

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